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NOTES AND DESCRIPTIONS OF NEARCTIC  
TRICHOPTERA

BY NATHAN BANKS

WITH SIX PLATES

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No. 6—*Notes and Descriptions of Nearctic Trichoptera*<sup>1</sup>

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In the course of checking on the material in the collection of the Museum of Comparative Zoölogy I have found various undescribed species, some of which are here described, and I have included notes on a number of described species, especially in the genus *Dicosmoecus*. Fortunately there is a male like the type and paratype of *Limnephilus scabripennis* from Plymouth, Mass.; this enables me to describe the allied forms.

Dr. H. H. Ross, in his paper on lectotypes in this Museum, naturally did not figure species based on one specimen. However, he often made preparations, and I have figured these for several species.

LIMNEPHILIDAE

*LIMNEPHILUS ADUSTUS* Bks.

Figs. 55, 56, 60

This was placed by Milne as a synonym of *perjurus* Hagen. Hagen's type is a female without abdomen, but the front tibiae have the spines black, in *adustus* some are pale, and in *perjurus* the fourth apical cell is fairly wide at base, in *adustus* very narrow. There are various minor differences, and so few points just the same it is evident that *adustus* is quite different from *perjurus*. Ross does not mention *adustus*, but does refer to *perjurus* as a female without abdomen. He, however, made a preparation of the genitalia, and I present figures. The superior appendages of female are rather long, swollen toward base, with a very slender acuminate tip.

The type is from Banff, Alta., 21 August; other males are from Eagle Lake, Maine (Packard), females from Slave Lake, H.B. Terr. (Kennicott), Flowers Cove, Newfoundland, 17 August (Fernald), and British Columbia (Crotch).

*LIMNEPHILUS SUBLUNATUS* Prov.

*L. macgillivrayi* Bks. was based on a male from northern New York, and *L. americanus* on females from Idaho. With more specimens it is now seen they are one species; Milne places the first as *sublunatus* and Ross the second as *sublunatus*; I have not seen the type nor any figures of *sublunatus*, but doubtless they are correct.

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Milne placed as male of *americanus* a specimen from Cultus Lake, British Columbia, but it is larger with differences in venation, and I consider a different species, certainly not *macgillivrayi*.

LIMNEPHILUS HYALINUS Hag.

Figs. 53, 54

This has been placed as a synonym of *L. extractus* Walk; but now that the genitalia of Walker's species has been figured in "Walker Trichoptera" it is seen that *L. hyalinus* is quite different. Ross gives no figure but refers to two of Betten's figures; No. 5 of Plate 46 is good except that the process on the side of the sheath is provided with three long spines, overlapping, and which may be so placed as to be unnoticed. The upper lateral piece, seen from within, has a broad black ridge or low process, and the blunt, truncate, black tip of the intermediate appendage is close to it, sometimes appearing as if united.

The species is common across northern United States and southern Canada. Besides the type the Museum of Comparative Zoölogy has specimens from Quesnal Lake, Brit. Col.; Vernon, Brit. Col.; Westbourne, Man.; Husavick, Man.; Temegami, Ont.; Mattewa, Ont.; Guelph, Ont.; Hull, Que.; Chatinguay, Que.; Lacolle, Que.; Ogussoc, Maine; Pinnacle Mt., Fulton Co., N. Y.; Freeville, N. Y.; Claremont, N. H.; Westport, N. Y.; Rock Lake, N. Dak.; and Great Lake, Colo.

LIMNEPHILUS FLAVASTELLUS Bks.

Figs. 58, 59, 65

This has been placed as a synonym of *L. externus*. The species is much more yellowish on the fore wings, smaller, and with a proportionally shorter discal cell. The difference in the shape of the superior appendages of the females is readily noted, (see figs. 64, 65). The genitalia of the males is extremely similar; the cercus (seen from side) is more pointed at upper tip in *externus* (Figs. 66, 67) and the large black tooth is conical; in *flavastellus* the tooth is rounded.

Specimens from British Columbia and Alaska are *flavastellus*, from Idaho east to Cape Breton, Nova Scotia are the common *externus*.

ANABOLIA SORDIDA Hagen

Ross says this has been considered to be *A. bimaculata*, and gives no figure. However, it is not *bimaculata*, but the species recently described

by Denning as *A. longicercus*. Besides the male type from North Red River, Uhler 1858, there is another male from Upper Wisconsin River Uhler, 1860.

#### ASTENOPHYLAX HESPERUS Bks.

Fig. 44

Of this species, described from one male as a Stenophylax, I now have specimens from Rosemary Inn, Olympic Mts., Wash., 21 to 29 July, (G. H. and J. L. Sperry). It belongs to Astenophylax inasmuch as there is a very short cross-vein connecting the subcosta to radius toward tip of wing; in some cases the radius and subcosta are united at one point.

*Astenophylax needhami* Ling is a synonym of *hesperus*. The male genitalia have the superior plates large concave from above, the outer part rolled over toward the middle, very different from those of *A. argus*. The claspers, from behind, are simple, elongate, somewhat pear-shaped with a smooth upper tip, not nearly as slender as in *argus*.

The upper tip of the female abdomen ends in very small fusiform plates, very unlike the broad plate with a median notch of *argus*. The female has the fore wings of the same uniform brownish color as the male.

#### CLISTORONIA MAGNIFICA Bks.

Figs. 40, 43, 49

Ross gives no figure, so I figure the preparation he made. From above one sees two large triangular, divergent processes; from the side are two rounded lobes. The penis is a remarkable structure; the membranous ribbed sheath is traversed by the dark tube, its tip but little modified; from each side near the middle arises a long curved process, toward tip divided into two branches, the upper one erect, long and tapering and on one edge with many long somewhat scale-like spines, the lower process curves upward, and, except for the tip, mostly clothed with long scale-like hairs or spines, many overlapping.

#### CLISTORONIA MACULATA Bks.

Fig. 47

Ross says this is the same as *formosa* Bks. The markings are much darker and heavier in both sexes. It is true that the male genitalia are

very similar, but in *maculata* the superior appendage, from side, has the lower outer corner not at all projecting as it does in *formosa*; the outer edge in *maculata* is an even concave curve; in *formosa* it is broken near middle by a hump, and in *formosa* the outer upper corner projects more than in *maculata*. The titillators of the penis-sheath are very similar, but in *formosa* the hyaline apical fringed part is broader than in *maculata*.

The females, which are marked in the same manner and amount as the males, are very easily separated. In *formosa* (Fig. 48) at tip of abdomen above is an elongate median piece with a median notch; in *maculata* this piece is very broad and short, with a distinct point in the middle; the lower median appendages are longer in *maculata* than in *formosa*.

I have another female of *maculata* from the White Mts. of Arizona, closely matching the original.

PYCNOPSYCHE SCABRIPENNIS Rbr.

Fig. 42

Rambur described this species thinking that it might be European, the specimens having no locality label. The type in Brussels Museum was figured by Ulmer; it is number 14 Coll. Latreille, the specimen in the Hagen collection has a label 13, and another "Coll. Latreille", Hagen has added a label "Amerique sept." The Hagen specimen, like the type, is a female and without abdomen. It also lacks one fore and one hind wing. The venation agrees with the Ulmer figure of the type; the discal cell is a little shorter than its pedicel; the granulations of the wing are not numerous as in *P. antica*, nor are they as large. The dark markings in this species are more prominent than in *P. conspersa*, but much as in *P. antica*.

Length of fore wing 16 mm.

Besides the cotype, without locality, there is a male from Plymouth, Mass., Sept. collected by E. A. Carpenter (father of Prof. F. M. Carpenter).

PYCNOPSYCHE ANTICA Walk.

Figs. 30, 31, 32

Based on a female from Georgia, Abbot collection. Figures and further description are given in "The Walker Trichoptera." The discal cell is fully one-half longer than the pedicel; the fore wing

strongly and fairly evenly granulate. The tip of last dorsal segment of abdomen is nearly truncate, the clasper is much like that of 6b in figure 58, page 346 of Betten's New York Trichoptera, the tip plainly blackened, truncate, outer corner prolonged, the inner edge with a notch and a tooth; the penis-sheath is rather swollen and with long appressed yellowish spines; at tip is one each side that is dark. The markings of fore wing vary much in distinctness.

Length of fore wing 19 to 20 mm.

From Georgia, Gerhard, 1860 (Hagen coll.); Auburn, Ala., (Baker); Pisgah Forest, N. Car., August; Black Mts., N. Car., Sept., (Beutenmuller); New Bloomfield, Penna., 6, and 12 Sept. (Daecher); White Mts., N. H., (Morrison); Baddeck, Nova Scotia, 14 Aug. (Fairchild); Englishtown, Cape Breton, Nova Scotia (Fairchild).

PYCNOPSYCHE MINIMA spec. nov.

Figs. 38, 39

In general this is a small form of *P. antica*, the discal cell being plainly longer than its pedicel; in marks, shape, and venation much like *antica*; the discal cell about five millimeters long and the pedicel only a little over three. The brown spots are more numerous toward the outer end so that they tend to form a border. The last dorsal segment of the abdomen projects roundedly more than *antica*, the lower lateral prolonged part is longer than in *antica*. The penis-sheath is covered with long appressed spines. The clasper has a truncate tip, no tooth at outer corner; the inner corner with a small sharp incision.

Length of fore wing 15 to 16 mm.

From Falls Church, Virginia, 8 and 22 October; and Lakehurst, New Jersey, 23 August. Type M.C.Z. No. 25825.

PYCNOPSYCHE CONSPERSA spec. nov.

Figs. 45, 46

This species agrees with *antica* in having the discal cell much longer than the pedicel. The fore wings are not so heavily marked as the other species; the brown spots are small and rather evenly scattered, except there are few in front of the discal cell; the band up from the hind margin across to discal cell is very faint; the brown mark beyond anastomosis is distinct, but short, and encloses the black dot in base of fork two.

The apical edge of the last dorsal segment of abdomen is truncate, not projecting, the lateral lobes of moderate length, the tip of clasper is not blackened, and in shape much as figured by Betten, figure 58, c, but the top is rather more truncate, evidently the same species; the intermediate appendages are pale (dark in other species), widened before the slender tip, the branches not divergent as in others.

Fore wing 18 mm. long.

A male from White Mts., N. H. (Morrison). Type M.C.Z. No. 25826. Dr. Betten gives the locality for his specimens as Old Forge, N. Y.

PYCNOPSYCHE PERPLEXA Betten

Fig. 35

This is the species that Milne identified as *P. dan* Sibley, but Dr. Betten says that *dan* is a synonym of *divergens*. A comparison of the females here with the description and figures of *perplexa* show they are the same. Normally in *Pycnopsyche* the base of the fourth apical cell is longer than the base of the fifth; in this species the relation is reversed. In the male the tip of the last segment above is broadly black across, not the usual two spots. Beneath are three black spots nearly in a row, the middle one is the double tip of the intermediate appendages, and the lateral ones the blackened inner tips of the claspers. These tips are broad (not pointed as in *divergens*). The penis-sheath has a number of stout spines each side.

Specimens are from Balsam, N. Car., 17 Sept.; North Mountain, Penna., Sept.; Ithaca, N. Y., 5 and 28 Sept.; Bar Harbor, Maine, 13 Sept.; Orono, Maine, July; and Baddeck, Nova Scotia, 4 Sept.

Allotype, Ithaca, N. Y., 28 Sept.

RHADICOLEPTUS SPERRYI spec. nov.

Figs. 2, 11, 12

♂ Body, legs, and antennae pale dull yellowish, basal joint of antennae more brown, tibiae and tarsi still paler yellowish, tip of abdomen brown; fore wings pale brownish yellow, with various silvery white spots and streaks, each margined with darker brown. A long silvery spot behind radius at about middle of length of wing; a round spot at apex of discal cell, a smaller one just behind it; a longer silvery streak behind the discal cell, reaching nearly one-half way to base.

Second apical cell with a long silvery spot at base, third apical cell with a short spot at base, and beyond is a longer streak, narrowed before tip; fourth apical cell with a small spot at base, and another beyond, half way to tip; fifth apical cell with a long spot at base, sixth apical with a shorter triangular spot near base.

Hind wings hyaline, with white fringe, veins white or pale yellowish. Head and thorax with snow-white hair; male palpi slender, second and third joints subequal; spines on legs black, spurs 1, 2, 3. The venation of fore wings is much like that of *flavicornis* and *fumosus*, but the discal cell is only about one and one-half times as long as the pedicel (in the others about twice as long), and the third and fourth apical cells are more narrowed at base than in those species. The last dorsal segment of abdomen shows a transverse, black spot each side on the apical part which is bent downward; the upper lateral pieces project roundedly below, and with much long white hair; the lower lateral pieces elongate triangular from side, sharp-pointed above, and seen from above project as a dark blunt tooth beyond the upper lateral pieces. Between them the penis has a slender, sharp tip, more swollen toward base.

In the female the silvery spots are not so large; there is no spot in the discal at tip, but in one wing a small round one before middle; the long streak behind discal cell is more interrupted behind, the spots on the fifth and sixth apical cells are the same as male, that in the second apical cell also the same, except a cloud in hind part; the third and fourth apical cells have very short silvery spot at base, and beyond in each cell there is a silvery spot more than its length before tip.

Length of fore wing 15 to 16 mm.

A pair from the White Mountains of Arizona, 20 June, 1935, taken by Grace H. and John L. Sperry. Type M.C.Z. No. 25757.

Readily separated from *flavicornis* and *fumosus* by the arrangement of silvery spots on fore wing, as well as by the shape of the parts of the male genital appendages.

#### HESPEROPHYLAX DESIGNATUS var. ISOLATUS var. nov.

Figs. 77, 78

In general similar to *designatus* from Hudson's Bay and Western Canada. The silvery marks on fore wings scarcely reach tip, but in shape like *designatus*. The fore wings are short and rounded at tip as in *designatus*. The principal difference is that the superior appendages are plainly narrowed before tip on upper edge much as in *incisus*.

The claspers have the apical narrowed portion shorter than in *designatus*, and the sheaths have rather longer spines at tip.

Size as in *designatus*.

Two males from Mt. Katahdin, Maine, Camp Kennedy, 3000 ft., August, Type M.C.Z. No. 25846.

HESPEROPHYLAX INCISUS spec. nov.

Figs. 24, 26, 27

Of the size and appearance of *H. magnus*, the silvery stripe on the fore wing being the same, not indented on each edge as in *H. occidentalis*; the structure and venation the same. In the male the upper lateral appendage shows a fairly large projection or tooth at the lower tip, much broader and not as long as in *H. magnus*, and the titillators are somewhat different as in figure. The female has two short, broad, flat pieces at tip of abdomen, quite different from the much narrower ones of *H. occidentalis*, and the very much longer and slender pieces of *H. magnus*.

Otherwise there is little difference.

Males of *incisus* come from Wallace, Idaho, 14 Sept. (Holotype) and 8 Sept.; Monache, Calif., 8300 ft., 11 July (Pilate in Eddy coll.); E. Humboldt Mts., Elko Co., Nevada, 24 June (G. H. and J. L. Sperry); and Saskatchewan, Canada, July.

Females from Wallace, Idaho, 26 Aug., 16, 30 Sept., 30 October; Nebo Junction, Utah, 12 July (G. H. and J. L. Sperry); Wellington, Brit. Columbia (Th. Bryant); Stockton, Utah (Spalding); and San Bernardino Mts. (Fish Creek) 6500 ft., Calif. (Grinnell). M.C.Z. type No. 25761.

*H. magnus* was based on several specimens; the lectotype male is the one from Palmerlee, Cochise Co., Arizona. This has the upper lateral appendage with a slender, elongate process at lower outer corner. Similar males are from Redington, Arizona and Carrizo, New Mexico. At time of description I had no females from Arizona, but put as female specimens from Utah and California. Since then I have received females from Arizona and New Mexico which have the superior plates at tip of abdomen very long and slender; these I consider the true females of *H. magnus* and herewith (Fig. 15) their appendages, and those previously used as females of *H. magnus* go with *H. incisus*.

The three very similar species (*occidentalis*, *magnus*, and *incisus*)

are readily separated by the external genitalia of both sexes. See Figs. 15, 16, 17, 18, 19, 25.

#### HYLEPSYCHE

This genus is readily separated from *Platycentropus* by lacking the spines on the venter of both sexes of *Platycentropus*.

The genitalia of the male type of *H. indistinctus* is now figured in the "Walker Trichoptera." The type was from "Newfoundland" and the Museum of Comparative Zoölogy has two males from Grand Lake, Newfoundland that agree; also two males and two females from the White Mountains, N. H., July (Morrison). The abdomen in all is only a little darker above than below. From above the genitalia of the female show a median transverse plate in which is a median semi-circular notch ending in a black tooth each side; above it is an elongate blunt process each side which scarcely extends beyond the plate (see Figs. 34 and 37).

The type of *H. amicus* Hagen is a female from New Orleans. The tip of abdomen shows a large transverse, somewhat elliptical cavity, (Fig. 36), the lower edge of which has a pair of submedian processes, no black-pointed teeth as in *indistinctus*; the upper edge of the cavity is nearly evenly concave, the lower lateral appendages have the lower tip black, seen from within, and in some specimens these protrude laterally.

Two other females are from Manumuskin, N. J., 8 October, and from Kingston, R. I., 6 September (Barlow); these are the same, and of same size, larger than *indistinctus*. In the three the abdomen is dark brown to black above, contrasting with the yellow venter. Besides these I have taken two females here (Holliston, Mass.) which are smaller and the genital parts, while on the plan of *H. indistinctus*, are different.

#### HYLEPSYCHE FRATERNUS spec. nov.

Fig. 33.

In general, similar to *H. indistinctus*, but the vertex is a reddish brown, the abdomen above black, the margin of each segment pale; the fore wings have the brown streak along lower edge of the second fork as in *indistinctus*, but the entire area behind the upper medius is more uniformly brown, the hyaline along cubitus restricted to basal part.

From above the genitalia (Fig. 33) show the transverse plate, with

a narrow median incision ending each side in a broader black ridge, the two not one-half as far apart as in *indistinctus*; above are the pale elongate projections, each one at tip more slender and black, and projecting beyond the plate below, so that when viewed from below one sees these two projections as prominent black spines, while in *indistinctus* from below one sees the black-pointed sub-median teeth of the transverse plate.

Length of fore wing 10 to 10.5 mm.

Two females from Holliston, Mass., 14 August, and 10 September. Type M.C.Z. No. 25802.

Ross has described another species, *H. plectrus*, from two males; the one here is from Prairie du Sac, Wisconsin. It is a larger species, and the male genitalia differ from those of *H. indistinctus*; from the locality there is little chance that it is the male of *H. amicus*.

#### STENOPHYLAX ANTENNATUS Bks.

Figs. 41, 50

Described from a male from Mt. Rainier. I have another male from Wallace, Idaho, 12 June (Huellemann). In this one the fore wings are more plainly marked, many small blackish irrorations, giving salt and pepper appearance to the wing. Seen from above the intermediate appendages are very slender and slightly divergent at tip; the penis is simple, half-way out its upper part ends in a dark crescentic lobe, and here from each side arises a long, stout, and slightly upcurved black spine; the tip of penis is bilobed. In the fore wing the anastomosis is before the end of the subcosta. In the hind wing the radius and subcosta lie side by side until near tip.

#### DRUSINUS FRONTALIS spec. nov.

Figs. 28, 29

♀ Fore wings uniform dark brown, about as dark as in *D. edwardsi*, costal and anal areas rather darker; hind wings smoky, but darker near costal tip; in fore wing are hyaline white spots on arculus and thyridium, a small circular white dot in base of fork two, and another behind thyridium, and a few fainter pale spots, mostly in apical part of wing. Head black, but face pale yellowish, also palpi; antennae black, crenulate below; thorax black above, with black hair and

bristles, pleura more yellowish; abdomen yellowish. Coxae and femora of legs yellowish, also basal third of hind tibia, elsewhere jet black.

Structure much like *edwardsi* and *atripennis*. Fore wings very minutely granulate, each granule tipped by an erect black hair; radius strongly bent before stigma, which is darker than rest of wing; discal cell fully twice as long as pedicel; fork one scarcely back on discal cell, fork three acute at base and slightly pedicellate. In hind wing subcosta and radius separated; forks one and three acute at base and pedicellate. Legs rather slender; spurs 1-3-3; on hind tibia one or two spines before middle, two before apical spurs. Tip of abdomen with two short sub-triangular divergent plates; on venter the parts in depression have the lateral pieces much narrowed at tip, the median piece broad and truncate.

Length of fore wing 16 mm.

One female from Thornhill Mt., 5000 ft., Terrace, British Columbia (Mrs. Hippisley). Type M.C.Z. No. 25839. Readily separated from *edwardsi* and *atripennis* by the very pale face and black apical parts of legs.

We have no species closely congeneric with the type of *Anisogamus*, and *edwardsi* and *atripennis* are better in *Drusinus*.

#### PHILOCASCA

Ross (Trans. Amer. Ent. Soc., LXVII, 111, 1941) makes this new genus for a new species, *demita*, said to differ from *Anisogamus* by the fused condition of the subcosta and radius in hind wing. However, in the genotype of *Anisogamus (difformis)* these veins are also fused, except near tip. In fact the same condition exists in many related genera, *Phacopteryx*, *Ecclisopteryx*, *Anisitella*, some species of *Drusus* and even in some *Halesus* in at least the male. In many other genera, *Peltostomis*, *Acrophylax*, *Asynarchus*, some *Stenophylax*, etc., the subcosta and radius touch each other most of the distance. Ross also mentions the broad fore wings and the expanded anal field of the hind wings which would indicate that *Philocasca* was close, possibly identical with *Phacopteryx*; a female from Oregon, which may be *demita*, agrees very well with *Phacopteryx*.

None of our caddice flies, as far as I know, are closely congeneric with *Anisogamus difformis*, which has a short-winged female, although other species (*aequalis*) have long-winged females.

However, our *Anisogamus costalis*, *A. disjunctus*, and a new species do have much resemblance to *Anisogamus* and in males, and usually

in females, have the subcosta and radius of hind wings fused for some distance. They have, however, another venational peculiarity, not present in allied European forms, a peculiarity which was used by Ulmer to make the genus *Astenophylax*.

CLOSTOECA gen. nov.

A Limnephilid related to *Anisogamus*; spurs 1-3-4; no spines under last joint of hind tarsi; two spines before apical spurs; no ocellar macrochaetae; wings of both sexes equally long; in fore wing the costal margin only slightly convex; radius much bent before stigma; anastomosis at or a little beyond end of the subcosta; discal cell but little longer than pedicel; membrane not or scarcely granulate.

In hind wing the subcosta and radius fused for some distance, at least in male, separating before end of the discal cell, and before tip again uniting or connected by a minute cross-vein; anal area not enlarged.

Genotype *C. sperryae* sp. nov. Also includes *Asynarchus costalis* and *Anisogamus disjunctus*.

CLOSTOECA SPERRYAE spec. nov.

Figs. 1, 4, 5

Face, palpi, and antennae dull yellowish, basal joint of antennae rather brownish above, and beyond many joints are slightly darkened at tip, in male very distinctly so; vertex reddish brown, with some white macrochaetae; thorax above also reddish brown to black, with white macrochaetae, and some black bristles in front of wingbase; pleura and legs dull yellowish, spines black, front tibia spined to base, hind tibia with about two spines before middle, spurs 1, 3, 4; abdomen dull brown; fore wings mostly light brown, with hyaline-white spots, at base of third, fourth, and fifth apical cells (in male not in fourth), sixth apical cell plainly paler toward tip; first and second apical cells not so dark brown, especially toward base; anastomosis dark brown and bordered with dark; two hyaline-white spots in median area, one just before the anastomosis, the second some distance before last, and connected to a larger spot behind in cubital area; a small pale spot over the arculus, and pale behind base of stigma, latter darker than rest of wing. Venation very similar to *disjunctus*, the lower cubitus not extending direct to outer margin, but connected by a short cross-vein

to the vein above it; discal cell not quite as long as pedicel; radius bent at base of stigma; fork one back a short distance on discal cell, fork two indents the anastomosis slightly, fork three scarcely before the anastomosis.

In hind wing the base of discal cell is plainly before the forking of medius.

The last dorsal segment of abdomen projects broadly over the genitalia, the clasper is slender, elongate, straight, seen from above incurved, and below it the penis, with a stout, curved sheath each side ending in two points.

Expanse ♀ 16 mm., ♂ 12 mm.

From Dunsmuir, Calif., 23 May (G. H. and J. L. Sperry), Type M.C.Z. No. 25821.

Very similar to *C. disjunctus*, but in that species the wing is paler and no hyaline spots except the thyridium and arculus.

#### CHILOSTIGMA AREOLARIS Walk.

Figs. 14, 21

One male from Ft. McMurray, Alta, 19 Aug. (Harper coll.). The markings of the fore wing are closely similar to the type. The second joint of male palpus is as long as the third, the latter plainly a little enlarged toward tip; the vertex has a median raised area; there is a macrochaeta a little behind and inward of each ocellus; the posterior warts are broad and a little curved. The genitalia from below show a pair of stout incurved processes, the upper end of which is bent backward, and seen from side; from above there are a pair of elbowed, rather long, tapering processes crossing each other before tips.

#### NEOPHYLAX SLOSSONAE spec. nov.

Figs. 8, 9, 10, 13

Head, thorax, legs, and wings pale yellowish; abdomen dull blackish above, pale beneath; head and thorax above with long pale bristles. Fore wings marked with pale brown leaving a pale, slightly yellowish, interrupted streak along hind margin much as in *concinnus*; apical margin also bisinuate almost as strongly as in *concinnus*; in fourth apical cell at margin is a hyaline white spot with marginal white hair, and in fifth and sixth apical cells is a united hyaline white spot with snow-white hair; obliquely through the apical cells somewhat parallel

to outer margin is a row of nearly connected hyaline spots; in middle of wing the brown is mostly in bands; hind wings very pale.

The male genitalia have the superior plate much as in *concinnus*, but below each side (if viewed obliquely) are two large triangular black teeth, just touching at tip; from below they appear as two elongate dark bodies, the lower the longer, behind the lower margin is a large concave area; spine on venter is longer than in *concinnus*.

Length of fore wing 10 mm.

A male from Franconia, N. H. (Mrs. Slosson), Type M.C.Z. No. 25841.

**NEOPHYLAX DELICATUS spec. nov.**

Figs. 22, 23

Head, thorax, legs, and antennae pale yellowish, abdomen brown above, dull yellowish beneath; head and thorax above with white hair and bristles. Fore wings pale yellowish, apical part and basal part in front of cubitus irrorate with pale brownish bands, tip of wing dark; a brown streak from cubitus behind, broken by a pale, more whitish than yellowish, marginal streak interrupted before the middle, not pale beyond arculus; outer marginal fringe partly snow-white and partly brown. Hind wings pale whitish, veins and fringe pale.

In hind wings there is no closed discal cell, the lower branch extending back and ending on radius a little before radial sector (as in *mitchelli*, *fuscus*, *ayamus*, *sinuatus*, and *pilosus*).

The male genitalia from below show a large subtriangular piece almost to a point in front, the clasper each side ends (when seen from behind) in a long fine dark claw or spine, but seen obliquely from the side there is an upper inner black point and below another dark tooth. From side the superior appendages appear much as in *mitchelli* (Fig. 20)

Length fore wing 7.5 mm.

A male from Delaware Water Gap, 1 Oct. (Mrs. A. T. Slosson), Type M.C.Z. No. 25842.

Structurally related to *N. mitchelli* but differing much in markings of wing as well as in details of genitalia.

**PHANOCELIA gen. nov.**

*Apatania canadensis* Bks. does not belong to the *Apatania* section since there are two black spines before the pair of apical spurs of hind tibiae. The size and general appearance is much like *Apatania*,

and the basal joints of antennae as long; however, there is no cross-vein at base of stigma, but the base is much narrowed; the general surface of wing is not granulate, and hair sparse and short. The wing is broader apically than in *Apatania*, and the fifth apical cell has a pedicel nearly one-half the length of cell. It will come near to *Algonquina*, but the stigma is more prominent, the wing proportionally wider, and the fifth apical cell long pedicellate.

I, therefore, propose a new genus *Phanocelia*, with *Apatania canadensis* Bks. as genotype.

Both Milne and Ross have placed it in *Glyphopsyche*, but it is not related to that section of the family.

APATANIA PICTULA spec. nov.

Figs. 3, 6

Head nearly black, with long snow-white hairs and bristles; thorax above also dark with similar snow-white hairs; abdomen dark brown above, below much paler, some long pale bristles near tip, genitalia pale yellowish; legs pale yellowish, spines black; antennae dark brown to black, with very short white hair below.

Fore wings marked with hyaline and brown, some of the hyaline is nearly white; the stigma, a border behind, and the costal area before are brown; apical margin rather broadly and irregularly pale brown, several cells with a pale spot on outer margin; anastomosis black, and bordered with dark, beyond all cells are hyaline for a short distance, then behind the stigma the apical veins are bordered with dark for a short distance tending to form a curved dark band; in some of upper cells the hyaline extends as a line between the dark; beyond this band and before the apical brown the cells are again hyaline about as far back as cubitus; discal cell mostly pale, and also area before it, toward base is a long dark streak behind cubitus, and toward tip the cubitus is heavily bordered with dark, reaching obliquely down to hind margin of wing.

Hind wings slightly smoky, the veins near tip somewhat bordered with dark.

Venation much like *A. stigmatella*, but the fifth apical cell reaches back before the anastomosis, and the discal cell is a little longer. On the hind tibia near tip before the apical spurs is the usual one black spine.

The genitalia from above show a slender curved cercus each side,

its tip dark, and below is a large body, the tip narrowed to a nearly square piece where there is a short upright hook or curved spine.

Fore wings 9 mm. long.

One male from Greer, Arizona, 11 June (G. H. and J. L. Sperry), Type M.C.Z No. 25820.

Readily known by its maculate wing.

It may here be noted that the species of Apatania and closely related genera have but one spine before the apical spurs on hind tibiae, while in most Limnephilidae there are two spines at base of the spurs. Several other genera also have but one spine at base of the apical spurs on hind tibia. Neophylax and Oligophlebodes go here, also Ecclisomyia and Acronopsyche. It is not a matter of size; the tiny *Psilopteryx brevipennis* has two, Algonquina and Apolopsyche have two, although some of their species are only one-half as large as some Neophylax and Ecclisomyia. These genera also have a frenulum.

#### NOTES ON DICOSMOECUS

Milne, in Studies in Trichoptera, 2, 1935, using length of fore wings and color of feet, reduced the seven then known names in Dicosmoecus to three species. In the paper by Ross on the Lectotypes of Trichoptera in the Museum of Comparative Zoölogy, 1938, he reduces the seven names to two species and gives figures for each. In this paper he does not state what figures were made from the lectotypes and which from specimens in his own collection and compared with the lectotypes. He gives a figure which is supposed to be that of both *atipes* and *gillivipes* although he made no preparation of the lectotype of either. He also gives figures of "*unicolor*", although *unicolor* was based on a unique female. He made preparations of the lectotype of *tristis* and of *quadrinotatus*, but did not publish a figure; these are quite different from the figure of the lectotype of the supposed male of "*unicolor*".

A brief examination of the preparations of male genitalia, as well as the external parts, convinced me that the treatment of Dicosmoecus by both Milne and Ross fails to represent the situation. I have had more than twice as many specimens. Dr. Better loaned me preparations of the specimens he had, Dr. Milne loaned me his figures, the Academy of Natural Sciences of Philadelphia loaned a most useful series, and Mr. D. Denning, who precipitated the inquiry by sending a male for identification, kindly loaned the specimen for study. Dr. F. M. Carpenter and Mr. Carl Parsons kindly made several preparations for me.

There is, of course, much more to be learned about the species of *Dicosmoecus*, but I have tried to present the facts and what I consider the correct interpretation.

McLachlan based his genus *Dicosmoecus* on *D. palatus*, a Siberian species; this is a dark-winged form much like our *D. obscuripennis*. In examining our species I have noticed that there are two groups, the dark-winged and the yellowish-winged forms. In the true *Dicosmoecus* the basal part of the clasper, seen from the side, has the upper and lower edges parallel, and the apical part is greatly enlarged toward base and is attached to the full width of the basal part (figs. 91, 93). In the species with yellowish wings the basal part tapers toward its tip, and the apical part is only a little enlarged to hinge to the basal part (fig. 92). From behind one sees in the typical *Dicosmoecus* that the base of the clasper has a tooth or process above, while in the yellowish species there is no such process.

In the fore wings the anal cell in the yellowish forms has a slender tip which reaches nearly one half-way to the arculus, while in the true *Dicosmoecus* the anal cell has no such slender tip and falls far short of reaching one-half way to arculus; likewise the bases of the second and fourth apical cells are not in the same positions.

I consider the yellowish forms to represent a new subgenus:

#### ONOCOSMOECUS subgen. nov.

Genotype: *Dicosmoecus tristis* Banks. In 1913 Martynov described a new genus, *Praecosmoecus*, from Kamtschatka based on a female specimen. His figure of the fore wing shows that fork one reaches back a long way on the discal cell; thus it is quite different from our forms.

The three genera and two subgenera can be separated as follows:

1. In fore wings fork one extends back a long way on the discal cell.  
*Praecosmoecus*  
In fore wings fork one scarcely goes back at all on the discal cell. 2
2. Front tibiae not spined to base; fore wings more pointed at tip; no large two-jointed claspers . . . . . *Allocosmoecus*  
Front tibiae spined to base; fore wings not pointed at tip; in male a pair of large two-jointed claspers . . . . . *Dicosmoecus* 3
3. Wings not yellowish; rarely with a black dot in base of second fork or behind thyridium; anal cell comparatively short and without a slender tip; base of fourth apical cell is fully as far out as the base of second apical cell. In male the apical part of clasper is greatly

enlarged toward base; in the female the tip of abdomen ends in two divergent flaps or plates.....subgenus *Dicosmoecus*  
Wings yellowish; a distinct black dot in base of fork two and another behind thyridium; the anal cell has a long and slender tip which reaches almost one-half way to the arculus; base of fourth apical cell is not as far out as base of second apical cell. In the male the apical part of clasper is but little enlarged at base, and seen from side hardly more than one-half the greatest breadth of basal part; in the female the abdomen ends in two pieces pressed together to form a tapering tube.....subgenus *Onocosmoecus*

DICOSMOECUS ATRIPES Hag.

Figs. 98, 100, 101, 117, 135

Mature specimens have the tarsi and part of tibiae black; in teneral specimens these parts are more or less pale. The superior appendages are very slender, the inferior appendages, seen from below, have the inner corner rounded, and more laterally is a sharp point. (Fig. 98.)

The penis sheath is short and with seven long spines, five close together on the outer end, and two nearer to the penis. (Figs. 100, 101.)

Tip of abdomen of female shows two somewhat fusiform plates (Fig. 135).

Hagen described *atripes* from Colorado Mts., August (Lieut. Carpenter); others before me are from Lake County, Colo.; South Park, Colo., 17 August (Oslar); Sapello Canon, New Mexico (Oslar); Yellowstone (Hayden Survey); Beaver Creek, Alta., 26 August (Carr); Deer Creek, Provo, Utah, 21 22 August, 1 September (Tom Spalding); Manitou, Colo., 18 July, (H. Skinner); Beulah, N. Mex. 17 August (H. Skinner)

DICOSMOECUS JUCUNDUS spec. nov.

Figs. 102, 108, 118

This is very similar in wings, legs, and general appearance to *atripes*, and externally there is little difference in genitalia; the apical part of clasper is not quite as long as in *atripes*, and, seen from side, a little more curved downward.

The flaps at the tip of abdomen of female are not as pointed as in *atripes*, but with a broadly rounded tip, and are not quite as long as those of *atripes*.

The penis-sheath (Fig. 102) has seven long spines as in *atripes*, but differently grouped; two rather shorter ones are together near base, a little beyond a group of three long ones, still further out is another long one, and at the end of the very slender tip of the lobe there is another long and very slender spine. It is of the same size as *atripes*, and perhaps but a variety.

The specimens are from Modoc Co., in the northeastern part of California, 29 July, 1 August (Lindsey coll.) Type M.C.Z. No. 25887; also from Upper Salmon River, mouth of Smiley Creek, Idaho, 16 August; Strawberry Creek, Strawberry Mts., Oregon, 20 August; and Wild Horse Canyon, Steens Mts., Oregon, 1 Sept. (Acad. Nat. Sci. Phila.)

DICOSMOECUS NIGRESCENS spec. nov.

Figs. 88, 90, 93, 96

This is related to *atripes*, the clasper having no small curved spine on inner carina as noted in *gilvipes*. The tibiae largely, and tarsi wholly, black. Fore wings have the veins and anastomosis deep black, and rather broadly bordered with black, much as in *partitus*, a white spot at thyridium; hind wings smoky, the veins black and bordered, especially toward tip of wing. The genitalia are similar to *atripes*, the basal enlargement of clasper is rounded on inner edge and only laterally is there a small tooth as in *atripes*, none on inner edge; the apical part of clasper fully as long as in *atripes*; the superior appendages, however are nearly twice as broad as in *atripes*. The sheath of penis differs strikingly from all other species; each lobe has two rows of the long spines, grouped differently and more numerous than in either *atripes* or *jucundus*, (Fig. 88). The divergent plates at tip of the female are more slender and tapering than in *atripes*.

Length fore wing 23 to 24 mm.

Two males from Richel Lodge, Montana, 8, 12, August, and female from Moran, Wyoming, (G. H. and J. L. Sperry). Type M.C.Z. No. 25830.

DICOSMOECUS PALLICORNIS spec. nov.

Figs. 82, 83, 86, 87

In general related to *atripes*, no pale spot in costal area near stigma, and the claspers, viewed from behind do not show an inner spine seen in the *gilvipes* group. The antennae are wholly fulvous, the tarsi pale,

scarcely at all darkened. In fore wings the veins are pale, forks one and two indent the anastomosis more than in other species, the membrane densely clothed with more yellowish hair than in *atripes*, and toward base distinctly golden. The hair on vertex and pronotum almost wholly yellowish, the antennae crenulate below as in others, size of *atripes*. The superior appendages are more slender than those of *atripes*; the apical part of the clasper longer than in *atripes* and less curved, the lower appendages, seen from below, show the lobe nearer to base than in *atripes*.

The sheath of penis does not project laterally, and at tip has several small black spines, and a few much smaller hyaline ones each side, sometimes rubbed off.

A male from Placer Co., California, Sept. Type M.C.Z. No. 25829; paratype from Round Valley, Inyo Co., California, October 15 to 30, in Dr. Betten's collection; also Inyo Co., California, October 1 (Acad. Nat. Sci. Phila.).

#### DICOSMOECUS GILVIPES Hagen

Figs. 89, 99, 107, 110, 111

The tarsi are yellowish to rufous; the base of wing is usually pale, but sometimes the veins darkened, many of the short hairs silvery. The superior appendages are much broader than in *atripes*, the claspers have their ventral end enlarged into a triangular point, and laterally where the edge is deeply concave one can see a short spine-like process or hook on the inner ridge (fig. 94) not present in *atripes*. The very long penis-sheath has a row of large almost scale-like spines (fig. 89). It can be readily recognized by the white costal spot above end of anastomosis, which is also present in the dark form, *D. grandis*. The tip of abdomen of female has short, broad, and pointed plates.

Types from Quesnel Lake, Brit. Columbia, 27 August (G. R. Crotch); others from Penicton, B. C., 21 September (Downes); Arrow-head Lake, B. C.; Wellington, B. C. (Bryant); Cultus Lake, B. C., 29, 30 September, 15 October; Reno, Nevada, 27 August (Hillman), Wallace, Idaho, 5 October (Huellmann); Cala. (Acad. Nat. Sci. Philad.).

#### DICOSMOECUS GRANDIS Ulmer

Figs. 85, 95

This is a very dark form of *D. gilvipes*, the genitalia being the same, or almost so; the fore wings have black veins bordered with black,

leaving only very slender pale areas, the base of wings not pale as in types of *D. gilvipes*. On the costa just above end of anastomosis is a hyaline white spot, and a similar larger spot on the thyridium, contrasting strongly with the rest of the wing. The legs are rufous, but the hind tibia, particularly in female, are dark on apical half.

The genitalia of male are about the same as in *gilvipes*; each lobe of the penis sheath is clothed with a row of scales, much as in *gilvipes*. The tip of abdomen of the female has two broad and almost pointed plates (Fig. 95).

The type is from Olympia, Washington; I have seen others from Oregon as follows: Bull Run Cr., (Trib. Fall Cr.) 14 October; McKenzie Bridge, 12 Oct.; and Mahama, 25 Oct. (D. C. Mote). This is, doubtless, best treated as a color variety of *gilvipes*.

#### DICOSMOECUS OBSCURIPENNIS Bks.

Figs. 97, 106, 114

Palpi brown, not paler at tips; hair on vertex partly rufous. Fore wings uniform brown, with black dot in base of second fork, and one behind the thyridium, latter and arculus hyaline; membrane and veins with much, largely erect, black hair, very few minute pale hairs. Hind wings nearly evenly brownish, the costal area darker, a black dot in base of fork two. In fore wing the base of fourth apical cell is about as far out as base of the second apical cell; anal cell has slender tip and reaches nearly one-half way to arculus; the medius forks closer to base of wing than in most of the other species, otherwise venation like allies.

Legs pale, unmarked; superior appendages slender; clasper with slender, apical part, slightly curved inwards, lower base with slight enlargement.

The sheath is very slender and at base has one short but fairly stout spine, at tip are two spines close together, between are two very slender curved hardly noticeable spines.

This is very similar to the genotype, *D. palatus* of Siberia, but with darker wings, the apical part of clasper slightly longer; in *palatus* the tips of palpi are plainly pale, and hair on head black.

*D. obscuripennis* is known only from Alaska.

#### DICOSMOECUS (ONOCOSMOECUS) UNICOLOR Bks.

Figs. 103, 126, 127

Besides the type from Snokomish River, Washington, I have females from Saltese, Montana, 22 August, and Banff, Alberta, 13 August.

Both are of the same size and like the type show a faint dark mark over the dot in fork two, and another around the thyridium; the dark dot behind thyridium is scarcely noticeable. The sheath of the ovipositor is plainly longer than in *occidentis* and at the widened part near base there is a minute tooth each side.

A male from Banff (Betten coll.) and another from Alaska may be males of this species; it differs from *occidentis* in that the third and fourth spines of the sheath are not widely separated (figs. 126, 127).

Most of the records under the name of "unicolor" undoubtedly are referable to other species.

DICOSMOECUS (ONOCOSMOECUS) OCCIDENTIS spec. nov.

Figs. 104, 116, 124, 125, 128, 132, 136

This is a pale yellowish species with the dark dots in base of fork two and behind thyridium distinct, and around each is a pale brown cloud, that near the thyridium usually extending toward discal cell, all much as in *coloradensis*. Venation is similar to related forms. The male genitalia have the superior appendages broad toward tip and scarcely narrowed toward base; the superior plate is much broadened toward base, and divided by a median line to basal fourth. The claspers have the apical part tapering from base to the sharp-pointed incurved tip.

The apical part of penis-sheath is provided with four spines (only two in *coloradensis*), the basal one extremely long and reaching tip of sheath, the next about one-half as long, the third about one-half of second, and the last is placed much beyond the third, quite short, and its tip hardly reaching the tip of sheath.

In the female the apical appendages are short, much shorter than in *unicolor*, and do not show the tooth each side, the tips slightly divergent; beneath the cavity on eighth segment shows the three little processes, the middle one without a groove or division.

Length of fore wing, ♂ 15 to 16 mm., ♀ 16 to 18 mm.

Holotype from Wallace, Idaho, 1 October (Huelleman); paratypes from Wallace, Idaho, 31 August; Ft. Resolution, British America (Kennicott); Great Slave Lake, Hudson Bay Terr. (Kennicott); Fernie, Brit. Columbia, 29 August; Cultus Lake, Brit. Columbia, 25, 29, 30 September, 28 October; Wellington, Brit. Columbia, 29 August (T. Bryant), Bozeman, Mont. 12, 13 August. Type M.C.Z. No. 25832. Paratypes M.C.Z. and Univ. Minn. Mus.

**DICOSMOECUS (ONOCOSMOECUS) ALASCENSIS spec. nov.**

Figs. 105, 123, 129.

Wings pale yellowish; the dark dots of fore wing distinct; there is a faint dark shade up from the thyridium, and another just beyond the anastomosis, leaving the apical third of discal and median cells clear; posterior part of wing brownish; the dark portions usually show some faint whitish or hyaline spots. From the side the apical part of clasper is slender and strongly curved downward, the superior plate is deeply indented about as in allies, the superior appendages are more narrowed toward base than in *coloradensis*. The lower appendages seen from below have a very slight lobe toward base, the apical part of clasper tapers rather rapidly to a slender sickle-shaped tip.

The penis-sheath has four spines at about equal distances apart; the one near tip short, the next longer, the one before that still somewhat longer, but not reaching tip of the one beyond, the fourth is very large and long and extends fully to tip of the sheath.

Length of fore wing 14 mm.

Two from Iditarod, Alaska, 29 July, 1 August. Type M.C.Z. No. 25831.

**DICOSMOECUS (ONOCOSMOECUS) TRISTIS Bks.**

Figs. 109, 115, 119, 138

The fore wings show the dark dot in base of fork two, but the one behind thyridium is faint or absent, and there are no dark surrounding clouds seen in *coloradensis*. In the female the ovipositor sheath has a small but distinct tooth each side before it narrows, and the tips do not recurve as in the other species.

The superior appendages of the male are not so much broadened as in *occidentis* and *quadrinotatus*; the superior plate divided to basal third; the sheath has five spines, the basal one very long, much as in *occidentis*, the second arises close to base of first, but much smaller, the next two rather close together, one-half as long as first, the last its length beyond the fourth, but hardly as far from tip of sheath.

The types are from South Park, Colorado, 17, 20, 25 August (Oslar).

**DICOSMOECUS (ONOCOSMOECUS) QUADRINOTATUS Bks.**

Figs. 113, 120, 121, 134

The uniformly brownish fore wings of the male separates this form from all except *D. obscuripennis* which is still darker, and has smaller

superior appendages. Both dark dots are prominent in the fore wings, and also in the female in which the wings are not as dark. The sheath of the ovipositor is scarcely longer than in *occidentis*, and there is no tooth each side near base; of the three processes on the venter the middle is broad, and without median groove, the lateral pieces lean toward each other beyond the middle piece.

Like *tristis* the penis-sheath has five spines toward tip, but the basal one is not so much longer than the others, and does not reach to tip of sheath; the three nearest tip are moderately short and very stout, the last reaches beyond the tip of sheath; in one specimen the usual pair at apex of inner part of sheath appear to come from the outer part, but do not.

The type is from Grand Lake, Newfoundland, 28 July, others from Baddeck, Cape Breton, Nova Scotia, 12 August (Fairchild), White Mts., N. H. (Morrison), Randolph, N. H. 23 August, 1 September (G. H. & J. L. Sperry).

DICOSMOECUS (ONOCOSMOECUS) COLORADENSIS Ulmer

Figs. 122, 130, 131, 133

This species is very similar to *D. tristis*, of the same size and shape of fore wings. The black dots are very distinct and each surrounded by a dark area; the dark around the thyridial dot extends across discal cell. In *tristis* the thyridial dot is scarcely evident, and no dark cloud. The venation is the same as in *tristis*. The male external genital parts are also similar to *tristis*; the superior appendages are smaller; the base of clasper (seen from behind) shows one or two small teeth as in *tristis*.

The armature of the sheath is entirely different; in *coloradensis* with two short spines as figured by Ross (Lectotypes, fig. 48), while *tristis* has five spines on each lobe of the sheath.

In the female (which is scarcely larger than the male) the terminal sheath (seen from side) is more slender than in *tristis*.

It was described from Colorado and Mr. Denning loaned a male taken by Prof. Mickel at Ward, Colorado, 16 August, 1940. Ross's specimen was from Inyo Co., California.

The Academy of Natural Sciences of Philadelphia has specimens from Inyo Co., California; Wild Horse Canon, Steens Mt., Oregon, 1 Sept., 4225 to 4400 (Rehn and Hebard); Strawberry Creek, Strawberry Mts., Oregon, 20 August, 4450 ft. (Rehn and Hebard); Upper Salmon River, mouth of Smiley Creek, Idaho, 16 August, 7200 ft. (Rehn and Hebard).

They are very much smaller than *D. unicolor*, much paler, and the fore wing proportionally broader at stigma; the shape of the terminal appendages of the female also different.

I consider it to be *coloradensis* since Ulmer refers to the dark clouds around the black dots, and also to two points on penis sheath; in *tristis* one would see more than two at the tip if any.

#### ALLOCOSMOECUS gen. nov.

In general appearance similar to the large black-veins species of *Dicosmoecus*; palpi long; antennae crenulate; anal cell rather short; the spurs 1, 2, 2. The fore wings are more slender and more pointed at tip, the venation similar to *Dicosmoecus* except that the radius is more sinuous just above base of fork one. The front legs are much less spiny than *Dicosmoecus*, not spined to base, and the spines on front tarsi are very few and short; last joint of hind tarsi without spines.

The male differs prominently in lacking the two-jointed claspers; instead the upper lateral appendages are greatly enlarged, somewhat similar to *Colpotaulius infernalis*.

It differs from the *Colpotaulius* group in lacking the row of black hair by the side of the femoral groove, and the tibial spur is not modified, nor is the pronotum enlarged; in this group it would come nearest to the Indian *Astratodina*, but besides lacking the femoral row of black hairs, it has crenulate antennae, and fork one is broad at base, not extending back on the discal cell.

#### ALLOCOSMOECUS PARTITUS spec. nov.

Figs. 73, 74, 76

Face yellowish, with some short black hairs, longer pale hairs above; vertex black, posterior warts fulvous, with black hair; antennae black, including basal joint below as well as above; thorax black, the mesonotal strips and the lateral lobes above base of wings, and the pronotal warts pale yellowish, hair partly pale, mostly black; the mesoscutellum and basal median lobe of metanotum pale yellowish, the mesoscutellum with some black but mostly pale hair; abdomen brown above on basal two-thirds, beyond and the venter yellow; pleura almost black, with the usual tufts of long white hair; femora pale yellowish, front and mid tibiae dark on basal half, pale beyond, hind tibiae pale

on basal third, dark beyond; tarsi with basal joint pale, others more or less black.

Fore wings marked as in *Dicosmoecus nigrescens*, but the two large pale areas, one beyond and one before the anastomosis are hyaline, the basal half of all apical cells hyaline, and the discal cell and cells behind to the anal vein also hyaline; thyridium with a snow-white spot; veins black, with short black bristles; the hyaline areas of the membrane with short white hair, the dark parts with short black hair. Hind wings dark beyond anastomosis and along costal area, the anal part evenly smoky; veins black, except the hyaline basal half of first anal vein. Structure similar in many ways with typical *Dicosmoecus*; the ocelli, however, are plainly more elongate, and hardly as large; the antennae are crenulate below, but not as strongly so; the venation similar, in hind wings the discal cell does not extend so far basad of the fork of medius as in *Dicosmoecus*, more like the *unicolor* group; the front tibiae are not spined to base, but only a few toward tip; spurs 1, 2, 2.

The genitalia are peculiar; the upper lateral ones are very large, concave within, and spreading; the superior appendages are extremely slender and close together, below there is a pair of prominent thorns, and from below there is a low median lobe with a pair of processes from near middle.

Expanse 52 mm.

One male from Wallace, Idaho, 22 September (Huellemann), Type M.C.Z. No. 25760.

The pale areas of fore wings, the dark basal antennal joint, the dark on front and mid tibiae, the pale yellowish areas on thoracic notum, and the male genitalia all serve to distinguish it.

## PHRYGANEIDAE

### BANKSIOLA CALVA spec. nov.

Figs. 61, 68, 69, 70

♂ In markings of fore wings very similar to *B. smithi*, but many of the dark cross-bands in cells are more slender, and in some areas fewer; in the apical part none of the pale spots come close to the margin, and in the hind wings only the dark marks along upper side are present. The middle of mesonotum and metanotum is black or almost so (pale in *smithi*); otherwise the color is as in *smithi*. In venation it is also similar to *smithi*, except that fork one goes back almost directly

opposite the forking of medius (much beyond in *smithi*). In hind wing the anastomosis is more in a straight line (see figure 61) than in *smithi*. The male genitalia shows the claspers much longer and more slender than in *smithi* or other species of the genus. They are curved to form a circle as large as the tip of the abdomen, their tips cross above; there is no tooth on the upper part as in other species, nor a rounded hump near base as in *smithi*, but on the lower inner side there are six or eight slender well-separated spines, and some slight irregular granules. From above, the end of the abdomen shows a transverse pale area, from which arise a number of long stiff bristles, each from a pit. From behind one sees in the middle an elongate triangular piece with the tip below.

Length of fore wing 10 mm.

One male from Medford, Mass. (F. G. Sanborn), Type M.C.Z. No. 25756.

*Neuronia childreni* Betten, based on a female; if from the Eastern United States or Canada, is probably the female of *Neuronia (Oligostomis) canadensis* Bks. The black on thorax and vertex, and the dark on basal part of femora, as well as the venation of hind wing agree with *canadensis*. In the females that I have seen the lateral processes at tip of the ventral plate are twice as long as the median pair.

#### DASYSTEGIA IMPROBA var. SACKENI var. nov.

Figs. 62, 72

Similar in many ways to typical form. The marks of the fore-wing tend to form spots, separated by pale areas, rather than the more evenly irrorate wings of the typical form. The fore wings are plainly broader than in typical form; holotype of *improba* 5.1 mm. wide, 15 mm. long; holotype of *sackeni* 6.2 mm. wide, 16 mm. long. The upper part of clasper is heavier than in typical form, and the tip of penis is plainly oblique, more nearly truncate in *improba*, the short process each side reaching over part of clasper in *improba* is short and enlarged at tip, in *sackeni* it is longer and not enlarged at tip.

Holotype ♂ from Axton, Adirondack Mts., N. Y., June, (MacGillivray and Houghton); another male from Franconia, N. H. (Mrs. A. T. Slosson); females from Catskill, N. Y., July (Osten Sacken) and White Mts., N. H., Type M.C.Z. No. 25838. The true *improba* with slender wings occurs in northern Maine.

## HYDROPSYCHIDAE

## ARCTOPSYCHE DIVERGENS spec. nov.

Figs. 75, 80

In appearance much like *Parapsyche elsis*, but not so much dark along the cubitus, and the marginal dark and pale spots not so contrasting. Venation much like *grandis*; the cross-vein from subcosta to radius about opposite the base of discal cell, the subcosta, however, runs out free to margin, not connected to radius near tip as in *grandis*.

The superior plate ends in two processes as in *almota (oregonensis)*, but the plate is much broader and the processes are stout, divergent, dark spines; the superior appendages are broad, obliquely truncate at tip and also divergent; below the superior plate there is a pair of dark, upcurved spines; the clasper has a large basal hump, and the lower part tapers to the end where there is a short upright piece; the penis is slender, a little enlarged at tip, the penis-sheath is broad and long and curved downward.

Length of fore wing 14 mm.

One male from Castella, California, 13 June (Grace H. and John L. Sperry). Type M.C.Z. No. 25844.

## ARCTOPSYCHE INERMIS spec. nov.

Figs. 79, 84

In general very similar to *A. grandis*. Wings marked about the same, in apex of first apical cell is a round clear spot, and two or three others above it, these are much more distinct than in *grandis*, venation also about the same, the subcosta runs out to the margin without bending down to radius near tip as commonly in *grandis*, the forking of lower branch of medius is more nearly to the forking of the cubitus than usual in *grandis*. The last joint of maxillary palpus is shorter than in *grandis*.

The genitalia are on the plan of *grandis*, but with two prominent differences: the penis has no slender process at tip, and the intermediate appendages are shorter and without the swelling toward tip present in *grandis*, thus more like *ramosa*, the superior appendages are a little broader than in *grandis*, the clasper is much like that of *grandis*.

Length of fore wing 13.5 to 14.5 mm.

Three males from Slate Creek, Blue River Valley, Summit Co., Colorado, 8211 ft., 13 July (S. E. Clagg). Type M.C.Z. No. 25843.

## SERICOSTOMATIDAE

## NOTIDOBIA ARIZONICA spec. nov.

Figs. 94, 112, 137

Body jet black, also front legs and antennae, rest of legs paler, but femora quite dark; vertex and mesonotum with long white hair; each joint of antennae on its inner side with a patch of snow-white hair. Fore wings with black veins and very dark membrane, thickly clothed with long black, and considerable snow-white hair, the latter is most prominent at greatest width of wing where it almost forms a broad band, elsewhere the white is scattered to make a mottled appearance. The hind wings are clothed with short black and yellowish hair, much as in *N. nigricula*. The venation is much as in allied species.

The male genitalia have the clasper much broader than in *N. nigricula* and a little broader than in *N. griseola*; the inner basal hook ends in two black teeth; the penis (seen from above) is deeply angularly notched at tip.

Length of fore wing, male 9.5 mm., female 11 mm.

From Todds Lodge, Oak Creek, Arizona, June 12 to 17 (G. H. and J. L. Sperry). Type M.C.Z. No. 25891.

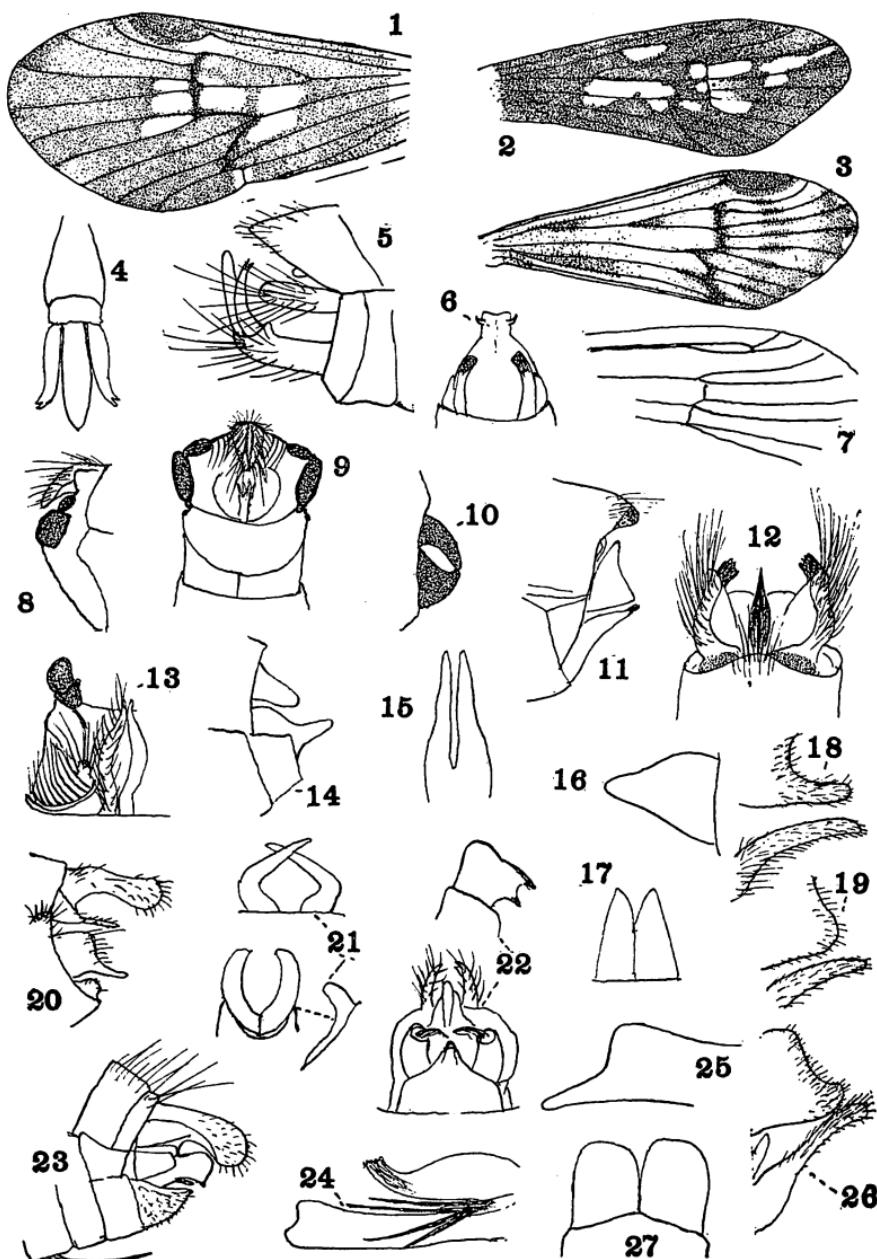
The color and length of hair on fore wings separate it from *N. nigricula*.

**PLATES**

**PLATE 1**

PLATE 1

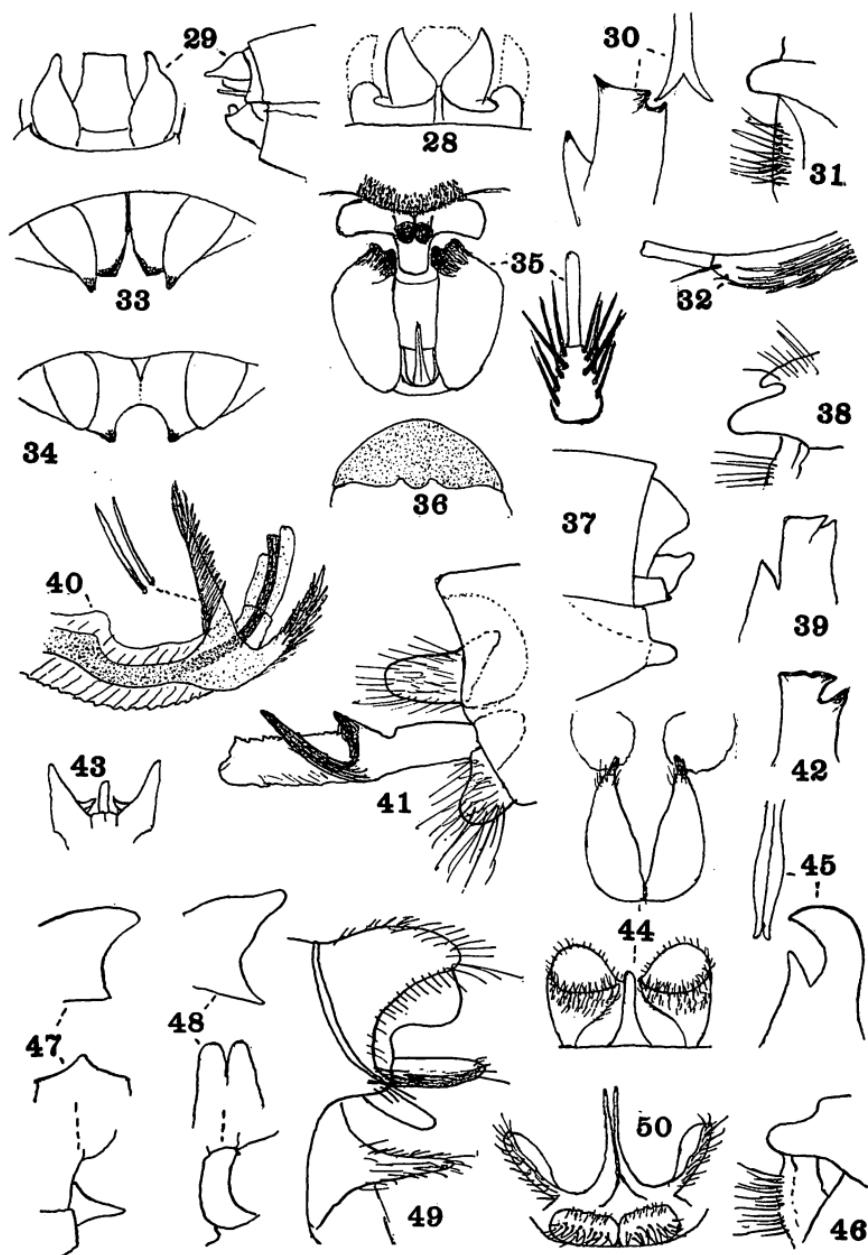
- Fig. 1. *Clostoecea sperryae*, fore wing.  
Fig. 2. *Rhadicoleptus sperryi*, fore wing.  
Fig. 3. *Apatania pictula*, fore wing.  
Fig. 4. *Clostoecea sperryae*, penis from below.  
Fig. 5. *Clostoecea sperryae*, genitalia from side.  
Fig. 6. *Apatania pictula*, genitalia above.  
Fig. 7. *Clostoecea sperryae*, tip of hind wing.  
Fig. 8. *Neophylax slossonae*, genitalia from side.  
Fig. 9. *Neophylax slossonae*, genitalia from below.  
Fig. 10. *Neophylax slossonae*, genitalia obliquely from side.  
Fig. 11. *Rhadicoleptus sperryi*, genitalia side.  
Fig. 12. *Rhadicoleptus sperryi*, genitalia above.  
Fig. 13. *Neophylax slossonae*, genitalia above.  
Fig. 14. *Chilostigma areolaris*, genitalia side.  
Fig. 15. *Hesperophylax magnus*, superior appendages of female, above.  
Fig. 16. *Hesperophylax occidentalis*, female appendage from side.  
*occidentalis* ~~Fig. 17.~~ *Hesperophylax occidentalis*, female appendage from above.  
Fig. 18. *Hesperophylax magnus*, male appendages from side.  
Fig. 19. *Hesperophylax magnus*, male appendages from side.  
Fig. 20. *Neophylax mitchelli*, genitalia from side.  
Fig. 21. *Chilostigma areolaris*, genitalia from above and beneath.  
Fig. 22. *Neophylax delicatus*, genitalia from below, and tip of clasper obliquely from side.  
Fig. 23. *Neophylax delicatus*, genitalia from side.  
Fig. 24. *Hesperophylax incisus*, penis from side.  
Fig. 25. *Hesperophylax magnus*, female appendage from side.  
Fig. 26. *Hesperophylax incisus*, male appendages from side.  
Fig. 27. *Hesperophylax incisus*, female appendages from above.



**PLATE 2**

PLATE 2

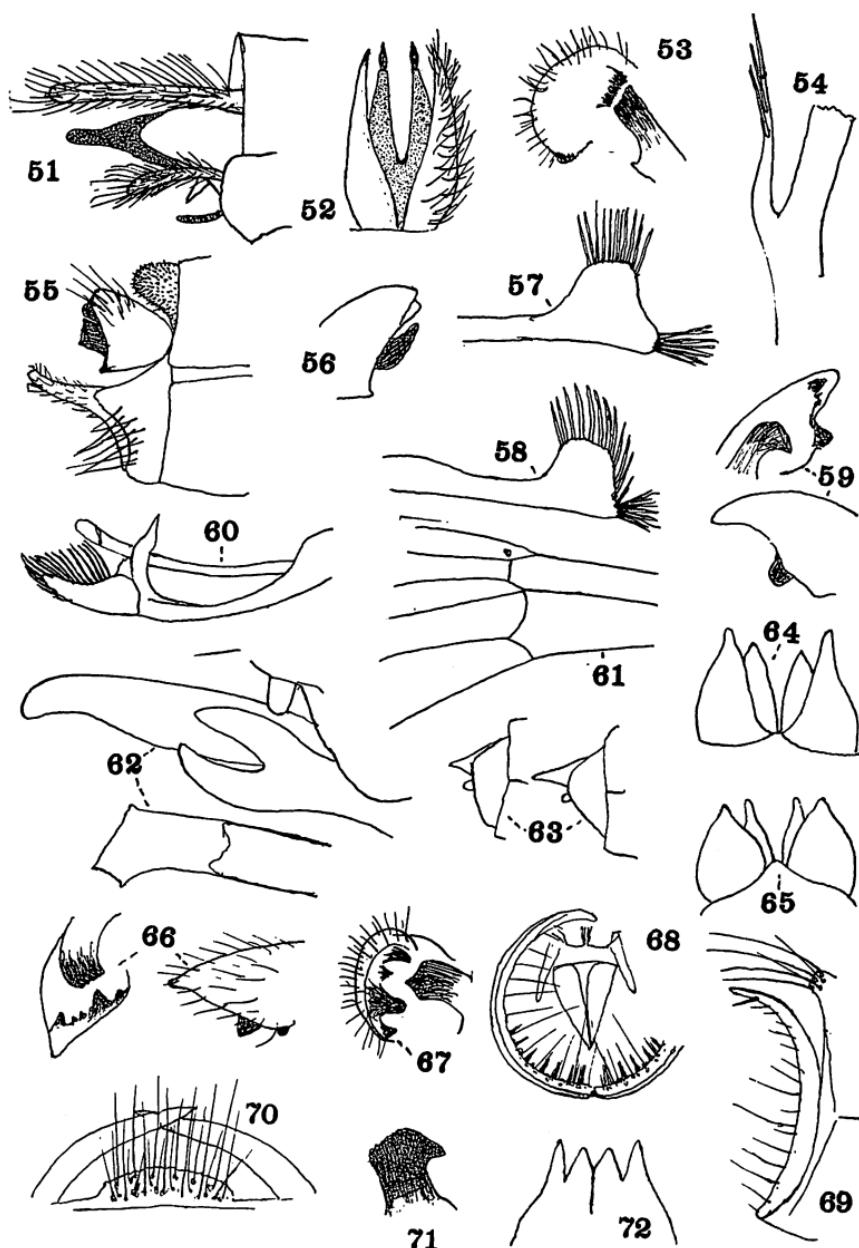
- Fig. 28. *Drusinus frontalis*, genitalia from above.  
Fig. 29. *Drusinus frontalis*, genitalia from below and side.  
Fig. 30. *Pycnopsyche antica*, tip of clasper.  
Fig. 31. *Pycnopsyche antica*, cercus from side.  
Fig. 32. *Pycnopsyche antica*, penis from side.  
Fig. 33. *Hylepsyche fraternus*, female from above.  
Fig. 34. *Hylepsyche indistinctus*, female from above.  
Fig. 35. *Pycnopsyche perplexa*, male from behind, and penis from below.  
Fig. 36. *Hylepsyche amicus*, female from behind.  
Fig. 37. *Hylepsyche indistinctus*, female from side.  
Fig. 38. *Pycnopsyche minima*, cercus from side.  
Fig. 39. *Pycnopsyche minima*, tip of clasper.  
Fig. 40. *Clistoronia magnifica*, tip of penis.  
Fig. 41. *Stenophylax antennatus*, genitalia from side.  
Fig. 42. *Pycnopsyche scabripennis* tip of clasper.  
Fig. 43. *Clistoronia magnifica*, male from above.  
Fig. 44. *Astenophylax hesperus*, behind and above.  
Fig. 45. *Pycnopsyche conspersa*, clasper at tip.  
Fig. 46. *Pycnopsyche conspersa*, cercus from side.  
Fig. 47. *Clistoronia maculata*, cercus from side, and female from above and side.  
Fig. 48. *Clistoronia formosa*, cercus from side, and female from above and side.  
Fig. 49. *Clistoronia magnifica*, genitalia from side.  
Fig. 50. *Stenophylax antennatus*, genitalia above.



**PLATE 3**

PLATE 3

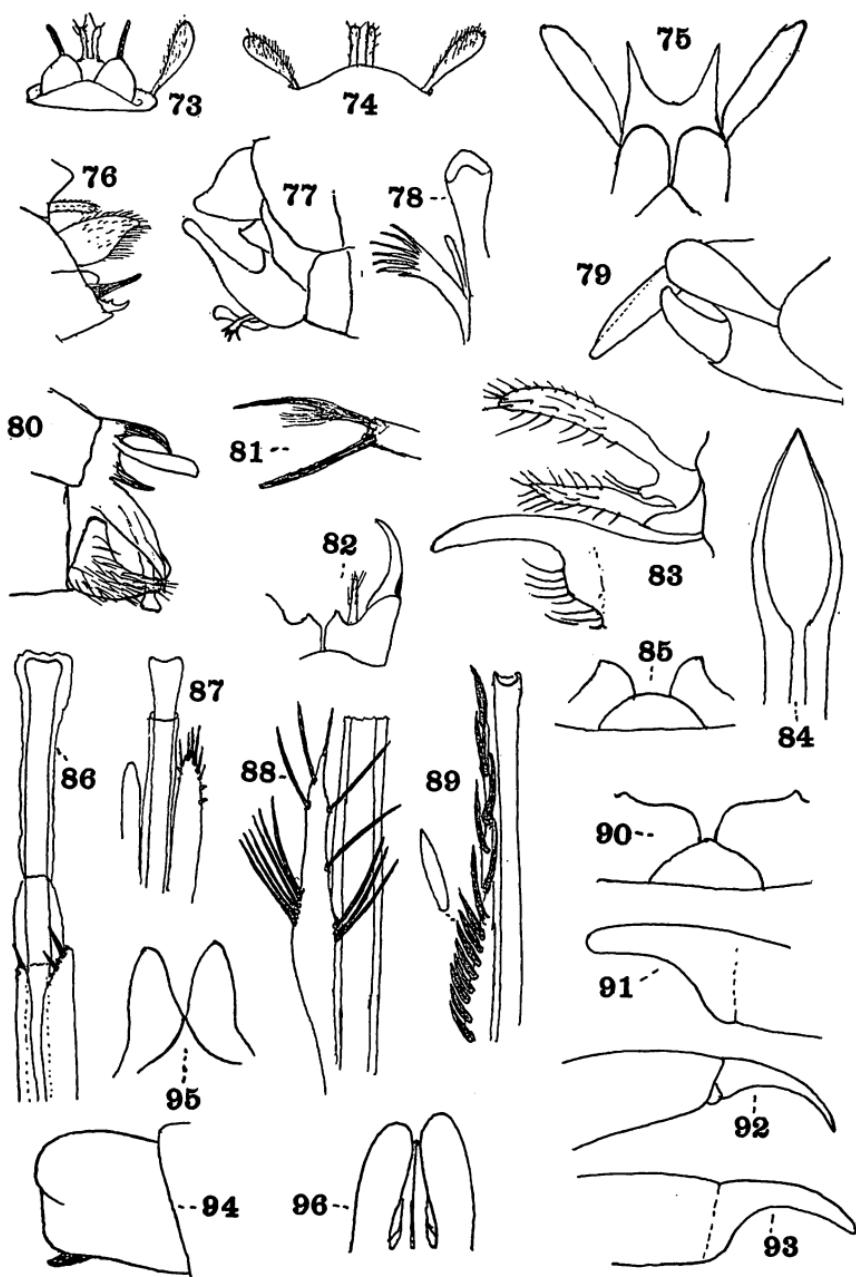
- Fig. 51. *Limnephilus americanus*, female from side.
- Fig. 52. *Limnephilus americanus*, female from above.
- Fig. 53. *Limnephilus hyalinus*, cercus, inner view.
- Fig. 54. *Limnephilus hyalinus*, curved process of sheath.
- Fig. 55. *Limnephilus adustus*, male from side.
- Fig. 56. *Limnephilus adustus*, cercus, seen obliquely.
- Fig. 57. *Limnephilus externus*, tip of sheath.
- Fig. 58. *Limnephilus flavastellus*, tip of sheath.
- Fig. 59. *Limnephilus flavastellus*, cercus from inside and outside.
- Fig. 60. *Limnephilus adustus*, penis and sheath.
- Fig. 61. *Banksiola calva*, part of hind wing.
- Fig. 62. *Dasystegia improba sackeni*, clasper and penis.
- Fig. 63. Tip of female of *Limnephilus flavastellus*, left, and *L. externus*, right.
- Fig. 64. *Limnephilus externus*, female above.
- Fig. 65. *Limnephilus flavastellus*, female above.
- Fig. 66. *Limnephilus externus*, cercus from inside and outside.
- Fig. 67. *Limnephilus externus*, cercus, of a Wyoming specimen.
- Fig. 68. *Banksiola calva*, genitalia from behind.
- Fig. 69. *Banksiola calva*, genitalia from side.
- Fig. 70. *Banksiola calva*, genitalia from above.
- Fig. 71. *Limnephilus flavastellus*, tip of intermediate appendage of male.
- Fig. 72. *Dasystegia improba sackeni*, tip of female from above.



**PLATE 4**

PLATE 4

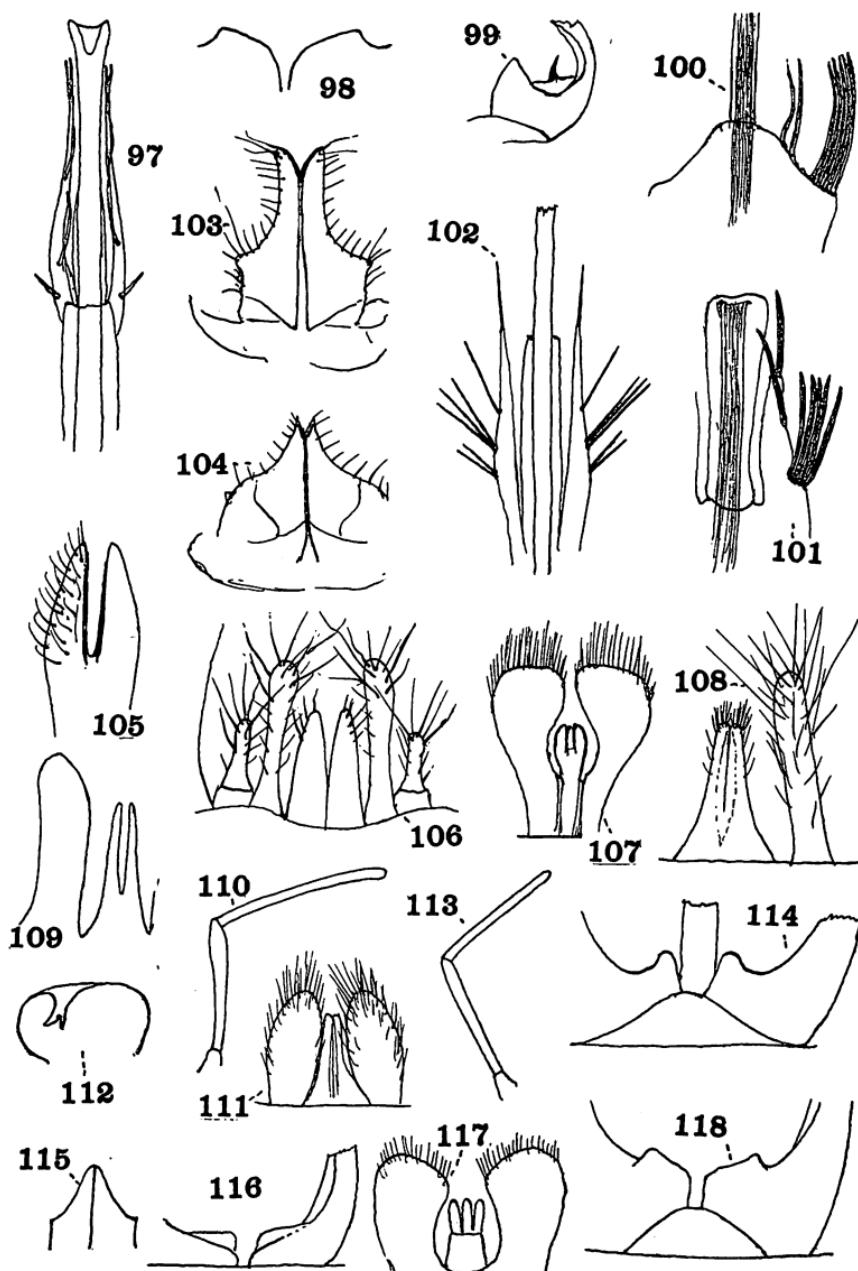
- Fig. 73. *Allocosmoecus partitus*, genitalia from below.
- Fig. 74. *Allocosmoecus partitus*, genitalia from above.
- Fig. 75. *Arctopsyche divergens*, genitalia, above.
- Fig. 76. *Allocosmoecus partitus*, genitalia, side.
- Fig. 77. *Hesperophylax designatus isolatus*, genitalia, side.
- Fig. 78. *Hesperophylax designatus isolatus*, penis and sheath.
- Fig. 79. *Arctopsyche inermis*, genitalia from side.
- Fig. 80. *Arctopsyche divergens*, genitalia from side.
- Fig. 81. *Neophylax concinnus*, spurs of hind tibia of male.
- Fig. 82. *Dicosmoecus pallicornis*, claspers from below.
- Fig. 83. *Dicosmoecus pallicornis*, genitalia, side.
- Fig. 84. *Arctopsyche inermis*, intermediate appendages, above.
- Fig. 85. *Dicosmoecus grandis*, base of claspers from below.
- Fig. 86. *Dicosmoecus pallicornis*, penis, paratype.
- Fig. 87. *Dicosmoecus pallicornis*, penis and sheath, type.
- Fig. 88. *Dicosmoecus nigrescens*, sheath.
- Fig. 89. *Dicosmoecus gilvipes*, sheath.
- Fig. 90. *Dicosmoecus nigrescens*, base of claspers from below.
- Fig. 91. *Dicosmoecus palatus*, clasper of genotype.
- Fig. 92. *Dicosmoecus occidentalis*, clasper.
- Fig. 93. *Dicosmoecus nigrescens*, clasper.
- Fig. 94. *Notidobia arizonica*, clasper from side.
- Fig. 95. *Dicosmoecus grandis*, tip of female.
- Fig. 96. *Dicosmoecus nigrescens*, cerci from above.



**PLATE 5**

PLATE 5

- Fig. 97. *Dicosmoecus obscuripennis*, penis and sheath.
- Fig. 98. *Dicosmoecus atripes*, base of claspers from below.
- Fig. 99. *Dicosmoecus gilvipes*, base of claspers from below.
- Fig. 100. *Dicosmoecus atripes*, sheath.
- Fig. 101. *Dicosmoecus atripes*, sheath, type.
- Fig. 102. *Dicosmoecus jucundus*, penis and sheath.
- Fig. 103. *Dicosmoecus unicolor*, female, tip of abdomen.
- Fig. 104. *Dicosmoecus occidentis*, female, tip of abdomen.
- Fig. 105. *Dicosmoecus alascensis*, superior plate.
- Fig. 106. *Dicosmoecus obscuripennis*, appendages from above.
- Fig. 107. *Dicosmoecus gilvipes*, female, eighth ventral segment.
- Fig. 108. *Dicosmoecus jucundus*, superior plate and cercus.
- Fig. 109. *Dicosmoecus tristis*, superior plate and cercus.
- Fig. 110. *Dicosmoecus gilvipes*, male palpus.
- Fig. 111. *Dicosmoecus gilvipes*, cerci above.
- Fig. 112. *Notidobia arizonica*, clasper from within.
- Fig. 113. *Dicosmoecus quadrinotatus*, male palpus.
- Fig. 114. *Dicosmoecus obscuripennis*, claspers from below.
- Fig. 115. *Dicosmoecus tristis*, female, tip from above.
- Fig. 116. *Dicosmoecus occidentis*, base of claspers from below.
- Fig. 117. *Dicosmoecus atripes*, female, eight ventral segment.
- Fig. 118. *Dicosmoecus jucundus*, base of claspers from below.



**PLATE 6**

PLATE 6

- Fig. 119. *Dicosmoecus tristis*, armature of sheath.
- Fig. 120. *Dicosmoecus quadrinotatus*, armature of sheath.
- Fig. 121. *Dicosmoecus quadrinotatus*, another specimen.
- Fig. 122. *Dicosmoecus coloradensis*, armature of sheath.
- Fig. 123. *Dicosmoecus alascensis*, armature of sheath.
- Fig. 124. *Dicosmoecus occidentis*, armature of sheath.
- Fig. 125. *Dicosmoecus occidentis*, another specimen.
- Fig. 126. *Dicosmoecus unicolor* ?, from Banff.
- Fig. 127. *Dicosmoecus unicolor* ?, from Alaska.
- Fig. 128. *Dicosmoecus occidentis*, armature of sheath, superior plate, and cercus of type from Wallace.
- Fig. 129. *Dicosmoecus alascensis*, clasper from below.
- Fig. 130. *Dicosmoecus coloradensis*, part of fore wing.
- Fig. 131. *Dicosmoecus coloradensis*, female, pit on eighth ventral segment, and tip of abdomen from above.
- Fig. 132. *Dicosmoecus occidentis*, armature of sheath, Ottawa specimen.
- Fig. 133. *Dicosmoecus coloradensis*, clasper and cercus from above.
- Fig. 134. *Dicosmoecus quadrinotatus*, pit on venter of female.
- Fig. 135. *Dicosmoecus atripes*, female tip of abdomen from above.
- Fig. 136. *Dicosmoecus occidentis*, female, pit on venter.
- Fig. 137. *Notidobia arizonica*, tip of female, above.
- Fig. 138. *Dicosmoecus tristis*, female, pit on venter.

